

Using FLIR and the UAS

Thermal imaging or FLIR (Forward Looking InfraRed) is passive and non-intrusive. It only detects infrared radiation directed outward from an object. Objects absorb infrared energy during the day as the sun heats the surface of the earth. After the sun sets, this temperature rise reverses as the absorbed energy reradiates and the object cools. The amount of energy absorbed during the day is proportional to the emissivity of the object; the measure of the materials ability to absorb and emit infrared (IR) energy. Large rocks in a grass field will retain and emit heat longer than the grass itself will, though both were subjected to the same infrared energy. All objects emit infrared radiation in varying amounts. This absorption of heat during the day is known as solar loading. After sunset, heated objects such as rocks, roadways, and buildings will begin to reradiate heat (infrared energy) back into the sky. Because of solar loading, the best results for law enforcement calls will be about three hours after sunset. The greater the temperature difference between the surrounding area and the target, the easier it will be to detect and locate the subject.

Water can be both a reflector and an emitter of IR energy. Sometimes it can appear to be a white hot emitter and possibly something we may be looking for. Other times it can also appear to be very black and act as a reflector. The FLIR can detect someone hiding in water, depending on the depth. When talking about water, examples of water may be a leaking septic tank or a stream or creek in which we're looking for someone. The FLIR can detect heat differences through smoke and haze, but atmospheric conditions and or rain can affect the reading of a thermal imager.

It's important to remember that the FLIR requires a thermal contrast to generate a clear image. Two objects of the same temperature are difficult to distinguish from one another on the FLIR.

Thermal cameras that can utilize a color range to show the difference in temperature (such as ours on the Inspire) are not valid in court on a criminal case. Imaging sensors used in thermal cameras do not distinguish colors as they are not operating in the visible light spectrum. The colors used do not represent any specific temperature; it is just a graded variation to make it somewhat easier to analyze a thermal image visually and are false color representations. It makes for great demos for sales, but it's harder for the eye to focus on color contrasts. Black and white images are more natural and quicker to process by the brain. Thermal cameras that show and record only in the grayscale (black and white) are admissible in court, as that is how the thermal sensors produce the original image.

No search warrant is required to conduct a thermal surveillance. However due to the US Supreme Court decision *U.S. vs Danny Lee Kyllo* 2001, the issuance of a search warrant is required for ***any thermal scan of a person's residence or where the curtilage is evident***. This should not be an issue for us as we will not be engaged in those types of operations (indoor marijuana grow).